CLAIMS

1. A method for treating at least one feed gas by adsorption, of the type in which a pressure swing adsorption treatment unit (16) is used and in which said treatment unit (16) is made to follow a nominal operating cycle defined according to nominal operating conditions and for the purpose of guaranteeing minimum feed gas treatment performance levels, characterized in that:

- at least one preprogrammed auxiliary operating cycle, different from the nominal cycle, is used;

- when the operating conditions differ from the nominal conditions to the point that the treatment unit (16) no longer achieves its minimum performance levels, the treatment unit (16) is made to follow the or one of the auxiliary cycles;

- the nominal operating cycle is identified by a triplet X.Y.Z, where X denotes the number of active adsorbers of the treatment unit (16), Y denotes the number of adsorbers in simultaneous adsorption and Z denotes the number of pressure balancing steps carried out on said nominal cycle; and

- at least one of the number X' of active adsorbers, of the number Y' of adsorbers in simultaneous adsorption and of the number Z' of pressure balancing steps carried out on the or each auxiliary cycle is different from the corresponding number of the nominal cycle.

2. The method as claimed in claim 1, characterized in that the composition of the feed gas is an operating condition.

3. The method as claimed in either of claims 1 and 2, characterized in that the pressure of the feed gas and the pressure of a waste gas output by the treatment unit (16) are operating conditions.

4. The method as claimed in any one of the preceding claims, characterized in that the temperature of the feed gas is an operating condition.

5. The method as claimed in any one of the preceding claims, characterized in that the flow rate of the feed gas is an operating condition.

6. The method as claimed in any one of the preceding claims, characterized in that preprogrammed intermediate steps are used for passing from one cycle to the other from among the nominal cycles and auxiliary cycle(s).

7. The method as claimed in any one of the preceding claims, characterized in that at least one of the pressure balancing steps is a partial balancing step so that at least one of the numbers Z and Z' is not an integer.

8. The method as claimed in any one of the preceding claims, characterized in that the nominal cycle and the or each auxiliary cycle include at least one adsorption step at a high pressure (HP) of the cycle, a purge step consisting of a countercurrent depressurization down to the low pressure (LP) of the cycle, an elution step at said low pressure, and a repressurization step up to said high pressure, the (duration of the adsorption phase)/(duration of the purge and elution steps) ratio being substantially between 0.5 and 2 for each of the cycles.

9. The method as claimed in any one of the preceding claims, characterized in that the treatment unit is a hydrogen production unit (16).

10. A combined hydrogen/carbon monoxide production plant comprising:

- at least one reactor for the production of a syngas;

- at least one unit for the decarbonization of the syngas;

- at least one unit for the purification of the decarbonized gas;

- at least one cryogenic unit for the production of carbon monoxide, connected to one outlet of the purification unit; and

- at least one unit for treatment by pressure swing adsorption, connected to another outlet of the purification unit,

characterized in that said pressure swing adsorption treatment unit is capable of implementing the method as defined in one of claims 1 to 9.

11. The plant as claimed in claim 10, characterized in that it includes a natural gas treatment line 12, downstream of which both a cryogenic unit 14 for production of carbon monoxide (CO) and a unit 16 for production of hydrogen (H_2) are connected;

the treatment line comprises, from upstream to downstream:

- a syngas production reactor 18, in which the natural gas is desulfurized, heavy hydrocarbons are decomposed into methane and carbon dioxide, and the methane is converted into a hydrogen-rich syngas containing carbon monoxide and carbon dioxide;

- an amine-scrubbing decarbonization unit 20, a carbon dioxide-rich waste stream of which is recompressed at 21 and recycled upstream of the reactor 18; and

- a purification unit 22 for arresting almost all of the water and greatly lowering the carbon dioxide content;

a first outlet 24 of the purification unit 22 is connected to the cryogenic unit 14, which includes a return line 26 provided with a heater 27, the line 26 returning to the purification line, and a second outlet

28 of the purification unit 22 is connected to the unit 16 so as to deliver the feed gas for this unit 16;

the purification unit 22 comprises two adsorbent bottles 22A, 22B placed in line alternately, in order to ensure purification, by temperature swing adsorption, of the gas mixture leaving the amine-scrubbing unit 20, the adsorption of water and carbon dioxide taking place when cold and the desorption of these components taking place when hot; and

the unit 16 comprises six adsorbers R1 to R6, each having an adsorbent material suitable for adsorptively fixing impurities such as hydrocarbons and water contained in the feed gas of the line 28.